

TECHNOLOGY NEEDS/OPPORTUNITIES STATEMENT

GETTER FOR HYDROGEN

Identification No.: RL-MW026

Date: October 2001

Program: Waste Management

OPS Office/Site: Richland Operations Office/Hanford Site

PBS No.: RL-CP02

Waste Stream: 1575 – M-91 Product Available to WIPP-CH, 1578 – WRAP Product Available to WIPP

TSD Title: TBD

Operable Unit (if applicable): N/A.

Waste Management Unit (if applicable): N/A.

Facility: 2336 Waste Receiving and Processing Facility (WRAP).

Priority Rating:

This entry addresses the “Accelerated Cleanup: Paths to Closure (ACPC)” priority:

- ☐ 1. Critical to the success of the ACPC.
- ☒ 2. Provides substantial benefit to ACPC projects (e.g., moderate to high life-cycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays).
- ☐ 3. Provides opportunities for significant, but lower cost savings or risk reduction, and may reduce uncertainty in ACPC project success.

Need Title: Getter for Hydrogen.

Need/Opportunity Category: *Technology Opportunity* – The Site desires an alternative to the current baseline technology.

Need Description: Adsorption/absorption of hydrogen in air inside drums and boxes containing TRU and other nuclear materials is required to ensure that explosive limits are not reached nor approached inside these containers.

Schedule Requirements:

Earliest Date Required: 2002

Latest Date Required: 2030

Technology needs to be deployed to support the shipment of CH-TRU waste to WIPP and would be useful anytime available when waste is being shipped to WIPP. This technology would alleviate the need for repackaging or other processing of waste with hydrogen concentrations exceeding transportation and shipping criteria.

Problem Description: Technology is needed to mitigate the production of hydrogen gas generation in packages used to ship the Hanford Site waste. The gettering material will have applications in the shipment of CH-TRU waste to WIPP and the shipment of nuclear materials to the SRS (if shipped).

Potential Life-Cycle Cost Savings of Need (in \$000s) and Cost Savings Explanation:
Zero cost saving is projected.

Benefit to the Project Baseline of Filling Need:
Reduced risk for shipment.

Relevant PBS Milestone: N/A

Functional Performance Requirements: The hydrogen getter must be highly efficient and must maintain its gettering efficiency over a wide range of temperatures, pressures, and humidity levels, and in a variety of transportation environments. Getter performance must not be impaired by the presence of volatile organic carbon (VOC) and must maintain its affinity to hydrogen over the range of use conditions.

Work Breakdown Structure (WBS) No.:	TIP No.:
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1.02.02.04	N/A.
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Justification For Need:

Technical: A gettering material that functions well in broad transportation environments is not available.

Regulatory: Shipment of materials from the Hanford Site to offsite destinations: NUREG-1609, *Standard Review Plan for Transportation Packages for Radioactive Material (DRAFT)*, (NRC 1997) requires that a package demonstrate that hydrogen and other flammable gases make up less than 5% by volume of the total gas inventory within any confined volume.

Shipment of materials on the Hanford Site: *Implementation Guide for Use with DOE O 460.1A Packaging and Transportation Safety*, requires transportation safety documents to follow the guidance of U.S. Nuclear Regulatory Commission (NRC) regulatory guides.

Environmental Safety & Health: There are safety concerns associated with shipping flammable quantities of gas mixtures and radioactive materials.

Cultural/Stakeholder Concerns: Facilitate shipment of CH TRUW to WIPP and closure of the Plutonium Finishing Plant (PFP).

Other: None identified.

Current Baseline Technology: Hydrogen gas getters have been studied at the Los Alamos National Laboratory (LANL) as part of the TRUPACT-II Payload Expansion Plan, but have been shown to be poisoned by VOCs and carbon monoxide. It is important that the getter is not adversely affected by poisons and will respond favorably to other transportation environments as well.

End-User: Waste Management Programs, Nuclear Material Stabilization

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	TRUW for WIPP
Waste volume, m ³ (Figures represent the total waste volume to be shipped to WIPP, only a portion of which, TBD, will require hydrogen gettering)	Existing: 12,100 m ³ Projected: 6,600 m ³ Total: 18,700 m ³
Waste form	Solid components in various containers
Waste stream I.D.	1575, 1578
Contaminants and co-contaminants	Alpha, beta and gamma radiation
Function of technology	Reduce risk of TRUW container explosion by gettering hydrogen
Source category	Various Hanford Site programs